IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A system for printing documents, comprising:

means for generating digital documents having handwritten text and machine printed text and for generating a request to print at least one of said digital documents;

an intelligent printing control interface connected to said means for generating which receives said request and selectively processes said request using Hidden Markov Models to remove said handwritten text; and

means connected to said intelligent printing control interface for printing said selectively processed request.

2. (Currently Amended) The system of Claim 1, wherein said intelligent printing control interface further comprises:

a virtual printer driver for receiving said request;

a printing control panel for determining whether to process said request; and

a handwriting separation module for selectively processing said request using Hidden Markov Models, under control of said printing control panel, to remove said handwritten text.

3. (Original) The system of Claim 2, wherein said handwriting separation module processes said request by segmenting the digital image into a plurality of text blocks, computing an observation sequence for each of said text blocks, computing a first probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for machine printed text, computing a second probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for handwritten text, comparing said first probability and said second probability for each of said text blocks, marking said text block as machine printed text if said first probability is greater than said second

probability, marking said text block as handwritten text if said second probability is greater than said first probability, and removing said marked handwritten text.

4. (Currently Amended) A system for copying documents, comprising:

a scanner for generating a digital document having handwritten text and machine printed text and for generating a request to print said digital document;

an intelligent printing control interface connected to said scanner which receives said request and selectively processes said request to remove said handwritten text using Hidden Markov Models; and

a printer connected to said intelligent printing control interface for printing said selectively processed request.

5. (Currently Amended) The system of Claim 4, wherein said intelligent printing control interface further comprises:

a virtual printer driver for receiving said request;

a printing control panel for determining whether to process said request; and

a handwriting separation module for selectively processing said request using Hidden Markov Models, under control of said printing control panel, to remove said handwritten text.

6. (Original) The system of Claim 5, wherein said handwriting separation module processes said request by segmenting the digital image into a plurality of text blocks, computing an observation sequence for each of said text blocks, computing a first probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for machine printed text, computing a second probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for handwritten text, comparing said first probability and said second probability for each of said text blocks, marking said text block as machine printed text if said first probability is greater than said second

probability, marking said text block as handwritten text if said second probability is greater than said first probability, and removing said marked handwritten text.

7. (Original) A method of separating handwritten text from machine printed text in a digital image containing a mixture of handwritten text and machine printed text, comprising the steps of:

A. segmenting the digital image into a plurality of text blocks;

B. computing an observation sequence for each of said text blocks;

C. computing a first probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for machine printed text;

D. computing a second probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for handwritten text;

E. comparing said first probability and said second probability for each of said text blocks;

F. marking said text block as machine printed text if said first probability is greater than said second probability; and

G. marking said text block as handwritten text if said second probability is greater than said first probability.

8. (Original) The method of Claim 7, further comprising the step of post-processing the digital image after each of said text blocks are marked as either machine printed text or handwritten text to correct single errors.

9. (Original) The method of Claim 7, wherein said segmenting step comprises the steps of:

generating connecting components within the digital image; and

grouping said connected components into a plurality of text blocks.

10. (Original) The method of Claim 9, wherein said grouping step comprises the steps of:

determining if each pair of neighboring connected components are on the same line;

for a given pair of neighboring connected components on the same line, determining if said pair of neighboring connected components are adjacent to each other;

for a given pair of neighboring connected components adjacent to each other, determining if said pair of neighboring connected components have the same height; and

if said pair of neighboring connected components have the same height, merging said pair of neighboring connected components together into a single text block.

11. (Original) The method of Claim 10, wherein said step of determining if said pair of neighboring connected components are on the same line comprises the steps of:

identifying minimum vertical coordinates for each of said pair of connected components;

determining if the difference between said minimum vertical coordinates of said neighboring connected components is less than a first predetermined threshold determining; and

when the difference between said minimum vertical coordinates of said neighboring connected components is less than a first predetermined threshold determining, marking said pair of connected components as being on the same line.

12. (Original) The method of Claim 10, wherein said step of determining if said pair of neighboring connected components are adjacent to each other further comprises the steps of:

identifying maximum and minimum horizontal coordinates for each of said neighboring connected components;

determining if the difference between said maximum horizontal coordinate of a first of said neighboring connected components and said minimum horizontal coordinate of a second of said neighboring connected components is less than a second predetermined threshold;

determining if the difference between said maximum horizontal coordinate of said second of said neighboring connected components and said minimum horizontal coordinate of said first of said neighboring connected components is less than said second predetermined threshold; and

when the difference between said maximum horizontal coordinate of said first of said neighboring connected components and said minimum horizontal coordinate of said second of said neighboring connected components is less than said second predetermined threshold or when the difference between said maximum horizontal coordinate of said second of said neighboring connected components and said minimum horizontal coordinate of said first of said neighboring connected components is less than said second predetermined threshold, marking said pair of connected components as being adjacent to each other.

13. (Original) The method of Claim 10, wherein said step of determining if said pair of neighboring connected components have the same height further comprises the steps of:

identifying maximum and minimum vertical coordinates for each of said neighboring connected components;

determining the difference between the maximum and minimum vertical coordinate of a first of said neighboring connected components less the difference between the maximum and minimum coordinates of a second of said neighboring connected components is less than a third predetermined threshold; and

when the difference between the maximum and minimum vertical coordinate of said first of said neighboring connected components less the difference between the

maximum and minimum coordinates of said second of said neighboring connected components is less than a third predetermined threshold, marking said pair of connected components as having the same height.

14. (Currently Amended) A method for copying and printing documents, comprising the steps of:

generating a digital image of a document having both handwritten text and machine printed text;

generating a request to print said digital image;

processing said request to selectively remove said handwritten text using Hidden Markov Models; and

transmitting said selectively processed request to a printer for printing thereof.

15. (Original) The method of Claim 14, wherein said step of processing said request further comprises the steps of:

A. segmenting said digital image into a plurality of text blocks;

B. computing an observation sequence for each of said text blocks;

C. computing a first probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for machine printed text;

D. computing a second probability for each of said text blocks that said observation sequence would appear in a predetermined Hidden Markov Model for handwritten text;

E. comparing said first probability and said second probability for each of said text blocks;

F. marking said text block as machine printed text if said first probability is greater than said second probability; and

G. marking said text block as handwritten text if said second probability is greater than said first probability.

REMARKS

Claims 1-15 are pending in this Application. By this Amendment, Claims 1, 2, 4, 5 and 14 are amended, without prejudice or disclaimer, to more particularly point out and distinctly claim the invention.

In the September 7, 2004 Office Action ("the Office Action"), the Examiner rejected Claims 1, 4 and 14 as unpatentable as anticipated by U.S. Patent No. 5,181,255 to Bloomberg ("the '255 Patent"). The Examiner also rejected Claims 2 and 5 as unpatentable as obvious over the '255 Patent in view of U.S. Patent No. 6,043,823 to Kodaira et al. ("the '823 Patent").

With respect to Claims 1, 4 and 14, in the Office Action the Examiner asserted that the '255 Patent discloses each and every limitation of those claims. The '255 Patent is addressed to a system and method for identifying machine printed text and handwritten annotations in an image (Col. 1, lines 24-28). The system 100 is illustrated in Fig. 1A and includes a scanner 103 which processes a document 102 to generate a digital image that is supplied to a processor 106. Processor 106 receives the digital image, which may be sent to file storage 105 or memory 104. Processor 106 operates on the digital image to identify the machine text portions and the handwritten annotations by one of the two methods shown in the flowcharts of Figs. 1B and 1C (Col. 6, lines 7-54). The two methods used to identify the machine text portions and the handwritten annotations both rely upon morphological processing, not the use of Hidden Markov Models as in all of the pending claims, as amended herein (See, e.g., Col. 6, lines 7-11). Once the two separate portions (i.e., machine text or handwritten annotation) are identified, a mask is generated that is used to separate the machine text from the handwritten annotations, allowing either portion to be communicated to application specific hardware 108, e.g., a printer to be separately printed (Col. 6, lines 1-6).

With respect to Claims 2 and 5, the Examiner acknowledged in the Office Action that the '255 Patent does not include a printing control panel for determining whether to process the print request, as specifically required by those claims. As a result of this deficiency, the Examiner cited the '823 Patent in the Office Action as disclosing a system for extracting certain regions of an image based upon the characteristics of those regions and which specifically discloses the use of a printer control interface (i.e., user interface 106 in Fig. 1 that is used to determine which regions of the document to be edited out, Col. 14, lines 51-57). However, like the '255 Patent, the '823 Patent does not disclose the use of Hidden Markov Models to identify machine text portions and handwritten annotations in a document, as specifically required by all of the pending claims, as presently amended.

The present invention is addressed to a method of separating handwritten text from machine printed text in a document, so that only the machine printed text is printed. In particular, the different regions within the document (i.e., machine printed text and handwritten text) are identified using a method that is based on the use of Hidden Markov Models. As discussed above, by this Amendment, all of the pending claims are limited to a method that is based upon the use of Hidden Markov Models to identify the regions of handwritten text and the machine printed text. Since the prior art cited by the Examiner does not disclose using Hidden Markov Models to identify regions of handwritten text and machine printed text in a document, Applicants assert that all of the pending claims are patentably distinct over the cited prior art. Thus, Applicants respectfully request that the Examiner withdraw the rejections under 35 U.S.C. §§ 102(b) and 103 and allow all of the pending claims.